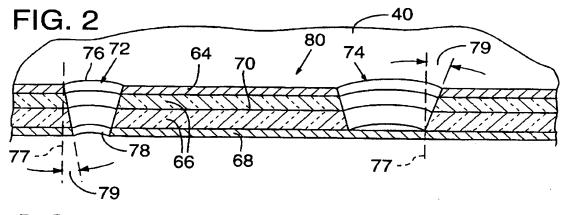
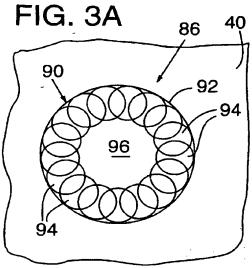


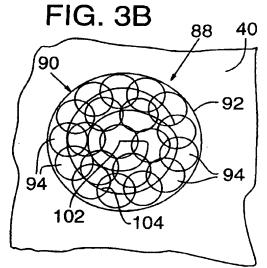
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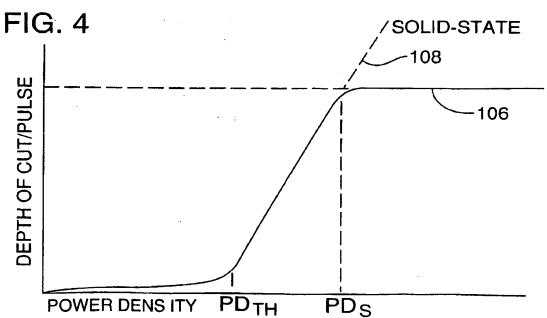


FIG. 6

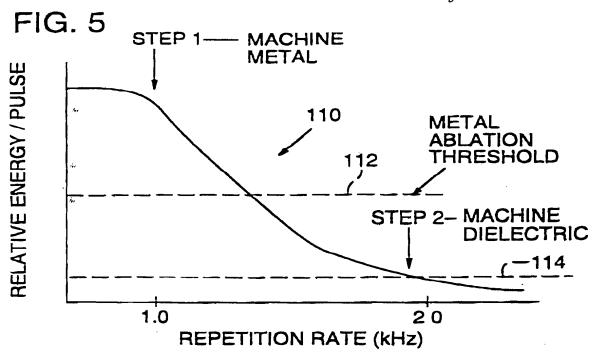
I HEREBY CERTIFY THAT THIS PAPER IS BEING FACSI-MILE TRANSMITTED TO THE PATENT AND TRADEMARK OFFICE ON THE DATE SHOWN BELOW.

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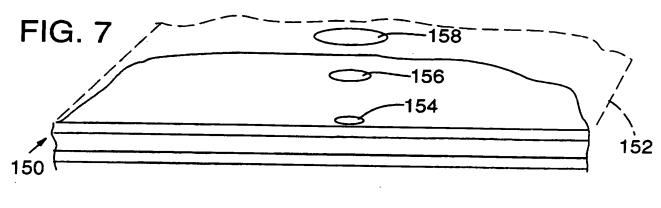
SIGNATURE

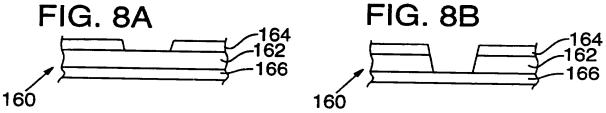
DATE

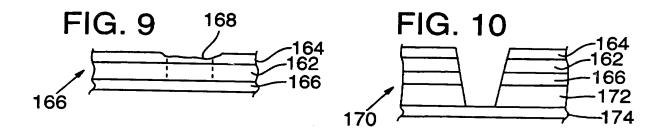


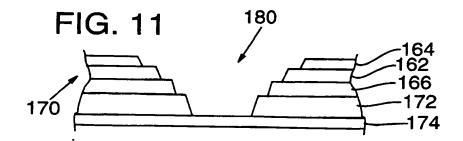
HETAL METAL ABLATION THRESHOLD THRESHOLD THRESHOLD THRESHOLD

SPOT DIAMETER (UNIT DISTANCE)









APPROVED O.G. FIG.
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		<u></u>										
				focus (mil)	0\$	50	50	. 50	90	50	. 50	90
			arams.	pitch	14.67	22	17.25	23	18.8	23.5	18.79	26.3
			Spiral Params.	rev	3	2	4	3	5	4	7	5
			S	þi	28	28	28	28	28	28	28	28
				Eff. spot (μm)	17	17	17	17	17	17	17	17
		epoxy		# of passes	1	1	1	1	<del></del>		1	1
Example 1=355 nm Laser  Step 1=15 $\mu$ m Cu  75 $\mu$ m Aramid reinforced	Step $2=75 \mu m$ Aramid reinforced epoxy		Bite Size (μm)	3.36	19	3.36	19	3.36	61	3.36	19	
Example 1	Step 1	tep 2=75 µm A		Power (mW)	0/4	100	470	100	470	100	470	100
		Š		Rep Rate (kHz)	1.4	0.248	1.4	0.248	1.4	0.248	1.4	0.248
				Speed (mm/sec)	4.712	4.712	4.712	4.712	4.712	4.712	4.712	4.712
			·	Step	1	2	1	7	1	2	1	2
				Via Size (µm)	150	150	200	200	250	250	300	300

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				Example 2	Example 2=355 nm Laser						
				Step 1	Step $1=18 \mu m$ Cu						
			Step	$2 = 51 \mu m(2 mil)$	$2=51 \mu m(2 mil)$ polyimide with adhesive	adhesive					
								S	Spiral Params.	rams.	
Via Size (μm)	Step	Via Size (μm) Step Speed (mm/sec) Rep Rate (kHz)	Rep Rate (kHz)	Power (mW)	Power (mW) Bite Size $(\mu m)$ # of passes Eff. spot $(\mu m)$	# of passes	Eff. spot (μm)	þi	rev	pitch	focus (mil)
100	1	2.62	6.54	089	7	1	25	0	0 2 12.5	12.5	20
100	2	2.61	0.217	06	12	. 2	25	25 0 1	1	25	20

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				Example 3=	Example 3=355 nm Laser						
				Step 1=	Step 1=18 μm Cu						
	;		Step 2=	42 μm thick Sp	$2 = 42 \mu m$ thick SpeedboardN (PTFE + epoxy)	( + epoxy)					
								S	iral P	Spiral Params.	
Via Size (μm	Step	Speed (mm/sec)	Rep Rate (kHz)	Power (mW)	Bite Size (μm)	# of passes	Eff. spot (μm)	pi	rev	pitch	focus (mil)
75	1	6.5	59:0	052	01	1	25				59
75	2	5.8	19.3	052	6.0	1	25	41	1	2	65
100	1	3.664	0.654	750	5.61	1	25	25	2	13.75	65
100	2	5	20	750	0.25	1	25	33	2	9.25	65
150	1	4.7	0.857	750	5.5	1	25	33	3	15.5	65
150	2	5	07	750	0.25	1	25	33	3	13.17	65
200	1	4.9	0.954	150	5.13	1	25	35	4	17.62	65
200	2	5	20	750	0.25	1	52	30	4	19.62	65

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				Example 4=	Example 4=355 nm Laser						
				Step 1= 36	Step $1 = 36 \mu m  \text{Cu}  (1  \text{oz})$						
				Step $2 = 8$	Step $2 = 84 \mu m Epoxy$						
								S	iral P	Spiral Params.	
Via Size (µm)	Step	Speed (mm/sec)	Rep Rate (kHz)	Power (mW)	Bite Size (μm)	# of passes	Eff. spot (μm)	pi	rev	pitch	focus (mil)
75	1	4	0.705	052	5.7	2	25	25		10	\$9
75	2	5.8	0.55	052	10.5	2	25				65
100	1	4.1	1.323	052	3.1	1	25	30	2	12.5	99
100	2	4.398	0.5	052	8.8	1	25	30	2	11.5	65
150	1	4	1.333	052	ε	1	52	22	8	16.17	\$9
150	2	3.979	9.0	150	69'9	1	52	25	3	16.5	\$9
200	1	4.18	1.393	150	ε	1	25	28	\$	14.8	99
200	2	5	9.0	750	8.33	1	25	30	\$	15.7	<b>S9</b>

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				Example 5=	Example 5=355 nm Laser						
				Step	Step 1=Cu			:			
		Step	Step 2=RFLEX 10001.	-828 Adhesive-	0001-828 Adhesive-Polyimide-Adhesive from Rodgers Corp.	ive from Rod	lgers Corp.				
								ďS	iral P	Spiral Params.	
Via Size (μm)	Step	Step   Speed (mm/sec)	Rep Rate (kHz)	Power (mW)	Bite Size $(\mu m)$ # of passes	# of passes	Eff. spot (μm)	þi	rev	pitch	focus (mil)
50	1	3.97	0.62	052	6.4	1	12				50
20	2	3.97	0.217	750	18.29	1	12				20
400	1	2.094	0.285	052	7.85	1	20	0	12	15	20
400	2	5.235	0.217	750	24.12	1	90	0	9	25	20

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	:									
				focus (mil)	99	99				
			Spiral Params.	rev pitch	2 15.25	29				
					iral P	rev	2	1		
:							Sp	id	15 28	15 31
				Eff. spot (μm)	15	15				
		ı Nelco		# of passes	1	2				
Example 7=355 nm Laser	Step 1= 12 μm Cu	nt E220 from N		Power (mW) Bite Size $(\mu m)$ # of passes Eff. spot $(\mu m)$	4.36	19.36				
	Step 1=	Step 2=Thermount E220 from Nelco	ep 2=Thermo		Power (mW)	400	001			
				Rep Rate (kHz)	1.1	0.267				
				Via Size (μm) Step Speed (mm/sec)	4.8	5.13				
								Step	1	2
				Via Size (μm)	12	140				

Fig. 19

				mi)	-
				focus (i	
			Spiral Params.	pitch	
			iral P	rev	
			Ś	þi	
				Power (mW) Bite Size (μm) # of passes Eff. spot (μm) id rev pitch focus (mil)	
		FE)		# of passes	
Example 8=355 nm Laser	Step 1=15 μm Cu	Step 2=50 µm Speedboard N (PTFE)		Bite Size (μm)	
Example 8=	Step 1=	p 2=50 µm Sp		Power (mW)	
		Ste		Rep Rate (kHz)	
				Via Size (μm) Step Speed (mm/sec)	
				Step	
				Via Size (µm)	

				cus (mil)	0	0
			rams.	pitch focus (mil)	20	
			Spiral Params.		2	
			Sp	id rev	35 10	
Example 9=266 nm Laser					35	-
		ced Epoxy		# of passes	1	-
	Step 1=15 µm Cu	Step $2=50 \mu m$ Duramid Aramid Reinforced Epoxy		Power (mW) Bite Size (μm) # of passes Eff. spot (μm)	1	1.5
				Power (mW)	150	300
				Rep Rate (kHz)	5	3.2
				Via Size (μm) Step Speed (mm/sec)	5	4.8
		,		Step	-	2
				Via Size (μm)	160	160

				Example 10:	Example 10=266 nm Laser				-		
				Step 1=	Step 1=15 µm Cu						
			Step	2=50 µmGore	Step $2=50 \mu MGore Speedboard N (PTFE)$	PTFE)					
								Sp	Spiral Params.	rams.	
Via Size (μm)	Step	Via Size (μm) Step Speed (mm/sec)	Rep Rate (kHz)	Power (mW)	Bite Size (μm) # of passes Eff. spot (μm)	# of passes	Eff. spot (μm)	þi	rev	pitch	pitch focus (mil)
160	-	5	5	150	-	1	38	35 10	2	20	0
160	2	4.5	3.75	305	1.2	.1	1				0

**\*** 

F1g. 22

				pitch focus (mil)	0	0
			rams.	pitch f	20	
			Spiral Params.	rev	2	
			Sp	id rev	35 10	
				Eff. spot (μm)	35	1
Example 11=266 nm Laser		ХУ		# of passes	1	1
	Step 1=15 μm Cu	SOLA 50 µm epc		Rep Rate (kHz)   Power (mW)   Bite Size (μm)   # of passes   Eff. spot (μm)	1	1.5
Example 11:		Step $2=50 \mu m$ ISOLA $50 \mu m$ epoxy		Power (mW)	150	08£
				Rep Rate (kHz)	5	3
				Via Size (μm) Step Speed (mm/sec)	5	4.5
				Step	1	2
				Via Size (µm)	160	160